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WhatsApp Chat Analyzer with Sentiment Analysis

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ABSTRACT: WhatsApp has become an integral part of our daily lives, serving as a primary mode of communication for millions worldwide. The WhatsApp Chat Analyzer simplifies the complexity of our conversations on this platform, offering users a comprehensive tool to explore and understand their chat interactions. By leveraging Python libraries such as pandas, seaborn, and matplotlib, this analyzer transforms raw chat data into insightful visualizations, providing users with a deeper understanding of their communication patterns. Additionally, the integration of sentiment analysis adds another layer of insight, allowing users to uncover the emotional nuances embedded within their chats. With its user-friendly interface and powerful analytical capabilities, the WhatsApp Chat Analyzer empowers users to gain valuable insights into their WhatsApp conversations effortlessly.

KEYWORDS: WhatsApp; Chat Analysis; Sentiment Analysis; Data Visualization; Machine Learning; NLP

I. INTRODUCTION

In today's digital age, WhatsApp has emerged as one of the most popular and widely used messaging platforms, facilitating communication among billions of users worldwide. With its seamless interface and diverse features, WhatsApp has become an integral part of daily life, enabling individuals and groups to connect, share information, and engage in conversations effortlessly. Recognizing the immense volume of conversations exchanged on WhatsApp, there arises a need to understand and analyze the dynamics of these interactions comprehensively.

The WhatsApp Chat Analyzer with Sentiment Analysis project aims to address this need by providing a robust framework for analyzing WhatsApp conversations and extracting valuable insights from them. By leveraging the power of data analytics and natural language processing (NLP), this project offers users the opportunity to gain deeper insights into their chat interactions, uncovering patterns, sentiments, and trends within the conversations. Through a combination of machine learning algorithms and advanced visualization techniques, the WhatsApp Chat Analyzer empowers users to make sense of their chat data in a meaningful way, facilitating better communication strategies, relationship management, and decision-making.

At its core, the WhatsApp Chat Analyzer with Sentiment Analysis project emphasizes simplicity, accessibility, and effectiveness. By offering a user-friendly interface and intuitive tools for data analysis, it enables users of all levels to harness the power of data-driven insights without requiring extensive technical expertise. Whether for personal use, professional communication, or academic research, this project provides a valuable resource for anyone seeking to gain deeper insights into their WhatsApp conversations and enhance their communication experiences.

II. LITERATURE SURVEY

The landscape of digital communication has been extensively studied in prior research, shedding light on various aspects of messaging platforms like WhatsApp. Existing studies have delved into topics ranging from linguistic features and conversational dynamics to social network analysis within chat applications. While this body of literature has provided valuable insights, there remains a notable gap in comprehensive exploratory analyses specifically focused on WhatsApp chats. The existing research has laid a foundation for understanding the nuances of digital communication, but there is a need for more detailed examinations of WhatsApp conversations. This project aims to address this gap by conducting an in-depth exploration of WhatsApp chats, encompassing critical aspects such as

message conversations. Additionally, by examining group interactions and dynamics, the research aims to provide a comprehensive understanding of digital social behaviours within the WhatsApp ecosystem. By bridging the gap between existing literature and empirical analysis, this project seeks to contribute novel insights into the realm of digital communication, with a particular focus on WhatsApp as a prominent messaging platform. Through a meticulous examination of chat data and the application of advanced analytical techniques, the study aims to enrich our understanding of digital social interactions and pave the way for future research in this domain.

III. PROPOSED SYSTEM

The proposed system, named the "WhatsApp Chat Analyzer with Sentiment Analysis," offers users a comprehensive platform to analyse their WhatsApp conversations seamlessly. This web-based application ensures compatibility across various devices and operating systems. Users can leverage the functionality of the WhatsApp Chat Analyzer by uploading WhatsApp chat data exported in the form of a .txt file.

Once the chat file is uploaded, users can initiate the analysis process by simply clicking the "Show Analysis" button. The system then performs an in-depth analysis of the chat data, providing users with valuable insights into their conversations, including sentiment analysis.

Advantages of WhatsApp Chat Analyzer with Sentiment Analysis:

1. **Universal Compatibility:** The application runs smoothly on all devices, ensuring accessibility for all users.
2. **Tailored Analysis:** The analysis provided by the WhatsApp Chat Analyzer is customized based on the specific WhatsApp chat file uploaded by the user, ensuring relevance and accuracy.
3. **Comprehensive Visualizations:** Users benefit from a range of visualizations that offer a holistic view of their chat data. These visualizations include metrics such as total messages, total words, media shared, and links shared, among others.
4. **Timeline Analysis:** The system offers insights into the monthly timeline of chat activity, highlighting the most active days and months within the conversation.
5. **User Engagement Analysis:** Users can identify the most active participants in the conversation, allowing for a deeper understanding of group dynamics and individual contributions.
6. **Linguistic Analysis:** The WhatsApp Chat Analyzer conducts linguistic analysis, revealing insights into the most frequently used words and emojis within the chat data.
7. **Sentiment Analysis:** In addition to providing traditional metrics, such as total messages and media shared, the system also conducts sentiment analysis on the chat data. This allows users to understand the overall sentiment of the conversation, including the distribution of positive, negative, and neutral sentiments.

IV. METHODOLOGY

The methodology employed in this study aims to provide a systematic and comprehensive approach to analyzing WhatsApp chat data with sentiment analysis. By integrating various techniques and tools, we strive to uncover valuable insights into digital communication patterns and sentiment dynamics. This section outlines the steps undertaken to preprocess the data, conduct sentiment analysis, calculate message frequencies, and visualize the findings. Through a structured methodology, we Endeavor to achieve a deeper understanding of communication behaviors within WhatsApp chats and contribute to the broader discourse on digital social interactions.

1. **Data Collection and Preprocessing:** The initial phase of the project involved the extraction and preprocessing of WhatsApp chat data to prepare it for further analysis. Leveraging Python's re (regular expression) and pandas libraries, a preprocessing module was developed to parse raw chat data into a structured format. The preprocessing module employs regular expressions to identify and extract essential components such as message timestamps and user names from the raw data. Subsequently, the data is organized into a pandas Data Frame, facilitating efficient manipulation and analysis. Timestamps are converted into datetime objects, enabling temporal analysis of message activity. Furthermore, the preprocessing module addresses message segmentation, ensuring accurate separation of user names and message content. Special handling is applied to group notifications and multimedia messages to maintain data integrity. Additionally, the module incorporates features for date and time extraction, enabling insights into messaging patterns across different time periods. Overall, the preprocessing module plays a critical role in streamlining the data preparation process, laying the foundation for subsequent analysis and visualization tasks.

- Statistical Analysis:** Another crucial component of the project is the statistical analysis module, aimed at quantifying various aspects of communication behaviour within chat groups. Statistical metrics such as message frequency, word frequency, and media sharing frequency are computed to identify patterns, trends, and outliers within the chat data. These metrics provide valuable insights into group interaction dynamics, shedding light on communication volume, media engagement, and prevalent topics of discussion.
- Sentiment Analysis:** The sentiment analysis module employs the TextBlob library to analyse the emotional polarity and subjectivity of messages. Each message is evaluated for its polarity and subjectivity scores, representing sentiment intensity and objectivity, respectively. Visualizations such as histograms are used to visualize the distribution of polarity and subjectivity scores, providing insights into the overall sentiment dynamics of the chat data.
- Visualization:** Visualization plays a pivotal role in communicating the analysed data effectively to users. Leveraging Python libraries such as Matplotlib, Seaborn, and WordCloud, the project generates diverse visualizations including word clouds, charts, and graphs. These visual representations offer intuitive insights into message distribution, sentiment trends, and group interactions, empowering users to comprehend and interpret chat data more effectively.
- User Interaction:** The WhatsApp Chat Analyzer offers interactive features that allow users to explore and interact with analysis results seamlessly. Customization options enable users to tailor visualization settings, filter data based on specific criteria, and drill down into individual messages for detailed examination. This user-centric approach enhances the overall user experience, facilitating more meaningful insights from the chat data.

V. RESULTS AND DISCUSSION

The analysis of WhatsApp chat data has provided a comprehensive understanding of group conversations, shedding light on diverse aspects such as message statistics, linguistic features, and activity patterns.

- Top Statistics for Group Conversation:** The analysis provides essential statistics summarizing the characteristics of the chat data, including the total number of messages, media shared, words exchanged, and links posted within the chat groups. These metrics offer a quantitative assessment of communication volume and media engagement, providing foundational insights into group interaction patterns.
- Most Common Words:** A visualization depicting the most frequently used words in the chat data has been generated. Using matplotlib, a graph was plotted to display the top words by frequency of occurrence. This analysis highlights the prominent topics and themes driving conversations within the chat groups.
- Most Busy Users:** User activity and contribution to the chat were analyzed to identify the most active participants. A graph illustrating user engagement frequency was plotted using matplotlib, providing insights into individual user behaviour and interaction patterns.
- Daily Timeline:** The frequency of messages exchanged throughout the day was analyzed to identify peak activity periods. Using matplotlib, a graph depicting daily message counts was plotted, allowing for the visualization of temporal communication patterns within the chat groups.
- Top Statistics:** Detailed statistics, such as total messages, words, images, and links shared, are presented to provide a comprehensive overview of communication activity. The chat file was converted into a data frame, allowing for the extraction and analysis of various data attributes. Additionally, URL extraction was employed to identify shared links within the chat data.
- Weekly Activity Map:** An analysis of user activity patterns throughout the week was conducted using a heatmap visualization. This analysis showcases user online and offline periods, offering insights into user engagement dynamics over time.

7. **Emoji Analysis:** An analysis of the most commonly used emojis in the chat data has been conducted. Using the Emoji library, emojis were distinguished from messages, and a pie chart was plotted to visualize their frequency distribution. This analysis offers insights into the emotional expression and communication style prevalent within the chat groups.
8. **Word Cloud:** A word cloud visualization was generated to represent the frequency distribution of words used within the chat data. This visualization technique highlights significant textual data points and emphasizes prevalent topics and themes discussed within the chat groups.
9. **Sentiment Analysis:** The sentiment analysis module assessed the emotional polarity and subjectivity of messages within the WhatsApp chat data. Using the TextBlob library, each message was evaluated for its polarity and subjectivity scores, representing the sentiment intensity and objectivity of the text, respectively. This analysis provided insights into the emotional tone of conversations, offering a deeper understanding of user sentiment within the chat groups.

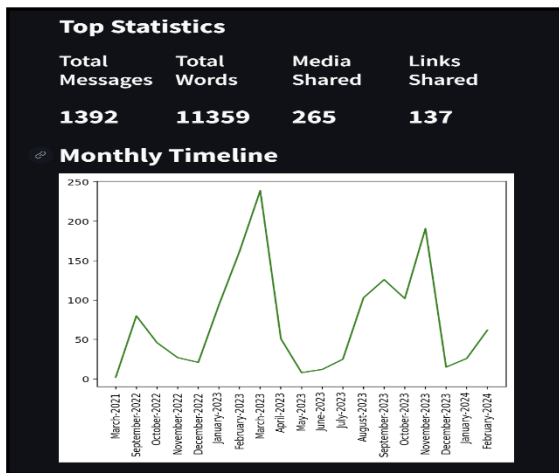


Fig.1. Top Statistics

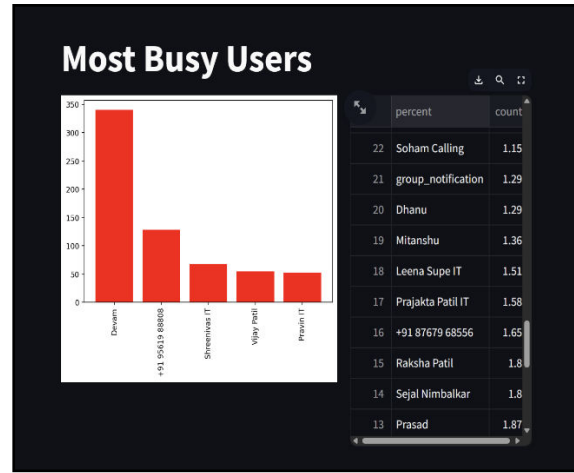


Fig. 2. Most Busy Users

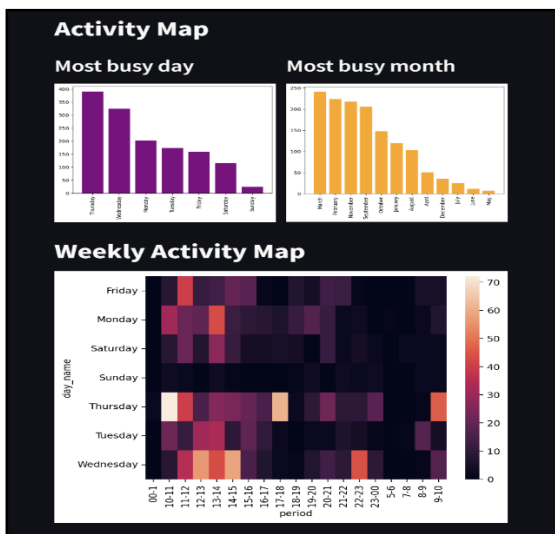


Fig. 3. Activity Map

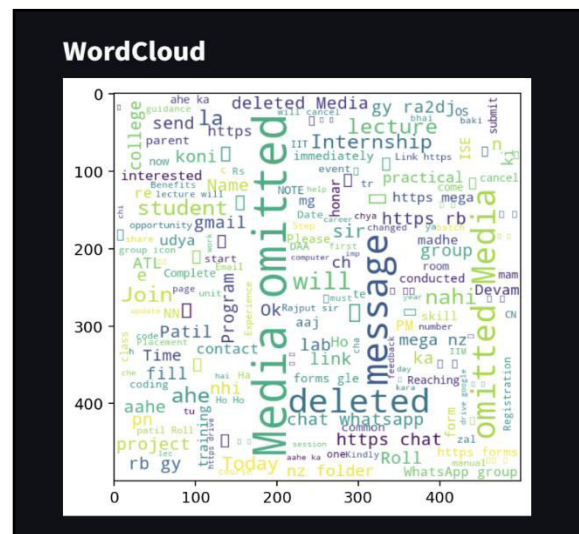


Fig 4. WordCloud

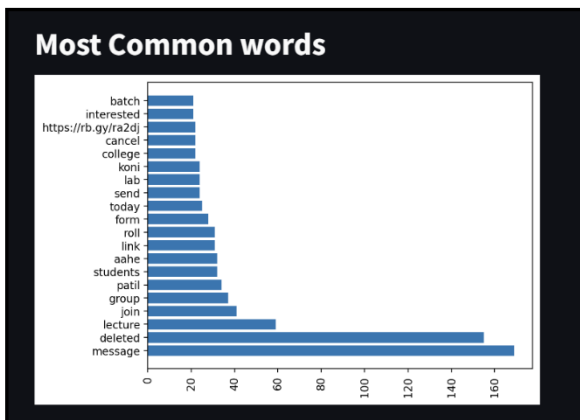


Fig. 5 Most Common Words

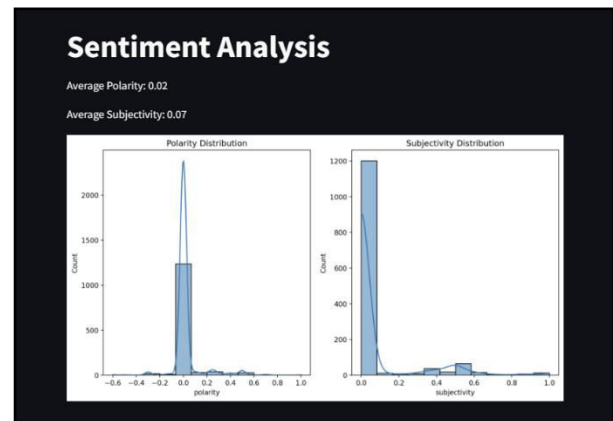


Fig. 6 Sentiment Analysis

VI. CONCLUSION AND FUTURE WORK

the WhatsApp Chat Analyzer with sentiment analysis represents a significant advancement in communication analytics, offering a robust platform for extracting insights from chat conversations. By integrating machine learning algorithms, natural language processing techniques, and advanced visualization tools, the project enables users to understand group interactions, linguistic patterns, and emotional expressions within chat groups. Through statistical analysis and visualization, valuable insights are gained into communication dynamics, sentiment trends, and user behaviour. Moving forward, opportunities exist for further research to enhance sentiment analysis techniques, develop real-time capabilities, expand visualization options, and integrate with external platforms, ultimately contributing to informed decision-making and understanding of communication patterns in diverse contexts.

Future work in advanced sentiment analysis for the WhatsApp Chat Analyzer entails exploring more sophisticated algorithms and techniques to enhance the accuracy and depth of emotion detection. This includes leveraging deep learning models such as transformers and recurrent neural networks (RNNs) to capture intricate nuances in language and context. Additionally, integrating domain-specific lexicons and ontologies could improve sentiment classification in specialized domains or languages. Furthermore, incorporating multimodal sentiment analysis, which analyzes text along with other modalities like images or voice messages, can provide a more comprehensive understanding of user sentiment. Real-time sentiment analysis capabilities could also be developed to enable instant insights and interventions during live conversations. Moreover, research into explainable AI methods for sentiment analysis can help elucidate the underlying factors contributing to sentiment predictions, fostering transparency and trust in the analysis results. Overall, advancing sentiment analysis techniques will enable the WhatsApp Chat Analyzer to offer more accurate, nuanced, and actionable insights into the emotional dynamics of chat conversations.

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